THE CLAIMS

Listing of Claims:

1.   (Previously Presented) An automated call routing system, comprising:

an automated call routing component to route an incoming call to a member of an organization and provide automated responses to one or more callers; and

a decision model, associated with the automated call routing component, that employs probability to determine likelihood of success in automatically routing the incoming call, the likelihood of success determined based in part on a sequence of system actions associated with the incoming call and is re-determined after the occurrence of each system action, to mitigate transferring the incoming call to an operator.

2.   (Previously Presented) The system of claim 1, further comprising a speech recognition component for communicating with the one or more callers.

3.   (Previously presented) The system of claim 1, the decision model is trained from a data log that has recorded data of past activities and interactions with the automated call routing component.

4.   (Previously Presented) The system of claim 3, the data log contains data relating to at least one of a Speaker Found, a Speaker Not Found, an OperatorRequest, a Help Request, a Hang Up, a Maximum number of Errrors, a Not Ready indication, or an Undefined category, or a combination thereof.

5.   (Previously Presented) The system of claim 1, the decision model processes one or more dialog features including at least one of system and user actions, session summary features, n-best recognitions features, or generalized temporal features, or a combination thereof.

6.   (Original) The system of claim 5, the n-best recognitions features are derived from a speech recognizer, and the generalized temporal features are included to cover trends between one or more n-best lists.

7.   (Previously presented) The system of claim 1, the decision model employs a probability tree to determine the likelihood of success in automatically routing the incoming call given a sequence of system actions.

8.   (Previously presented) The system of claim 7, the decision model determines the likelihood of success based on p(SpeakFound|E), wherein SpeakFound is the member, E is observational evidence of system actions taken, and p is a probability, in part by counting a number of logged cases along an action sequence that resulted in success over a total number of cases along the sequence.

9.   (Previously presented) The system of claim 1, the decision model employs a dependency network that processes one or more categories of dialog features as input variables.

10.   (Previously Presented) The system of claim 9, the decision model processes at least one of a sequence of system actions, a count or number of alternates in an n-best recognitions list, a number of times a user attempted to speak a name, a largest score assigned by a call routing system, or a number of dialog turns – defined as a question-answer pair, or a combination thereof.

11.   (Previously presented) The system of claim 1, the decision model employs a Markov Dependency network.

12.   (Previously presented) The system of claim 11, further comprising a component to increase an amount of data in order to boost a partial model for dialog turns over a marginal model.

13.   (Previously presented) The system of claim 1, the decision model includes at least one probabilistic model to perform at least one dynamic decision associated with costs and benefits of shifting a caller to a human operator.

14.   (Previously presented) The system of claim 13, the at least one probabilistic model provides at least one prediction about an outcome to enable administrators of automated call routing systems to specify preferences regarding the transfer of callers to a human operator.

15.   (Previously presented) The system of claim 14, the preferences are represented as a tolerated threshold on failure as a function of a current expected time that callers have to wait for a human operator, given a current load on operators.

16.   (Previously presented) The system of claim 1, the decision model is employed to facilitate staffing decisions by taking into consideration at least one of probabilistic performance of an automated system to route calls successfully, preferences about wait time, characterization of caller volumes, or time required for addressing callers in a queue waiting for an operator.

17.   (Previously presented) The system of claim 16, the queue is optimized based on a queue-theoretic formulation.

18.   (Previously presented) A computer readable medium having computer readable instructions stored thereon for implementing at least one of the call routing component and the decision model of claim 1.

19.   (Previously Presented) A system that facilitates call routing, comprising:

   means for interacting with a caller making a call to a user;

   means for automatically directing the caller to the user;

   means for determining probability of success in automatically directing the caller to the user, the probability of success determined based in part on a sequence of system actions associated with the call, the probability of success is re-determined after each system action; and

   means for performing a decision theoretic analysis before directing the caller to the user, the decision-theoretic includes a cost-benefit analysis weighing the benefits of transferring the caller to an operator.

20.   (Previously Presented) A method for automatically routing calls, comprising:

   determining a utility model for employment with a call routing system;

   training the utility model from a log of past system call activities;

   employing probability to determine likelihood of success in automatically directing a call to an organization member, the likelihood of success determined based in part on a sequence of system actions associated with the call and is re-determined after the occurrence of each system action; and

   automatically directing the call to at least one of the organization member or an operator, based in part on the likelihood of success.

21.   (Previously presented) The method of claim 20, the utility model is applied to a user function, $u(n,m,w)$, associated with a process of call routing, the user function is a function of a number of automated dialog steps taken, n, a total expected number of steps

that will be taken with an automated routing system, m, and a wait time, w, for transferring to a human operator.

22.   (Previously presented) The method of claim 21, further comprising processing user frustrations.

23.   (Previously presented) The method of claim 21, further comprising processing negative emotional reactions to working with an automated system versus a human operator.

24.   (Previously presented) The method of claim 21, further comprising performing a cost-benefit analysis of routing actions under uncertainty, considering a number and nature of at least one step in a dialog.

25.   (Previously presented) The method of claim 20, further comprising determining a utility of an interaction in accordance with a time cost of an interaction.

26.   (Previously presented) The method of claim 25, further comprising generalizing a conversion of steps to an effective total time of an interaction, wherein frustration is captured by increases in an effective total time of specific steps.

27.   (Previously presented) The method of claim 25, further comprising a pre-computation that is performed to yield, $p(\text{xfer}|E,\xi)$ and $p(\text{success}|E,\xi)=1 - p(\text{xfer}|E,\xi)$.

28.   (Previously presented) The method of claim 25, further comprising a pre-computation of probability distributions, $p(m|E,\text{xfer},\xi)$ and $p(m|E,\text{success},\xi)$ and an expected number of steps for conditions, labeled $<m>$ and $<m'>$, respectively.

29.   (Previously presented) The method of claim 20, further comprising determining an expected total wait time with continuing an automated interaction, t^a at respective points in a dialog under uncertainty in failure as:

$$t^a = p(\text{xfer}|E,\xi) \, (t(<m>) + w)$$
$$+ \, (1 - \, p(\text{xfer}|E,\xi)) \, (t(<m'>)),$$

wherein a wait time associated with a courteous immediate transfer into a queue for interacting with a human operator is w.

30.   (Previously presented) The method of claim 29, further comprising determining a utility of call handling as follows:

Utility of call handling $= p(\text{xfer}|E,\xi) \, u(t(n)+t(<m>) + w), C)$
$$+ \, (1 - \, p(\text{xfer}|E,\xi)) \, u(t(n)+t(<m'>)).$$

31.   (Previously presented) The method of claim 30, further comprising determining the utility of call handling as follows:

Utility of call handling =

$$1\text{-}p(\text{fail}|E,\xi) \, (p(\text{xfer}|E,\xi) \, u(t(n)+ \, t(<m>) + w, C, \text{success}) +$$

$$(1 - \, p(\text{xfer}|E,\xi)(u(t(n) + t(<m'>),0, \text{success})$$

$$+ \, p(\text{fail}|E,\xi) \, u(u(t(n)+ t(<m>),0, \text{fail}).$$

32.   (Previously presented) The method of claim 31, where cost of handling the call with a human operator C depends on needs or goals of the caller, and is inferred from evidence.

33.   (Previously presented) The method of claim 31, further comprising determining expected costs via inference of a probability distribution over Cost given evidence gathered so far, $p(C|E,\xi)$.

34.   (Previously presented) The method of claim 20, further comprising providing online sensing of current wait times for calls being transferred to a human operator.

35.   (Previously Presented) The method of claim 20, further comprising at least one of: creating an end-to-end system that continues to at least one of log, monitor, or build models, or a combination thereof; or

automatically setting parameters, generating reports, and generating traces, for validation and auditing of actions; or a combination thereof.

36.   (Previously presented) The method of claim 20 supporting an application including at least one of touch-tone routing and speech recognition.